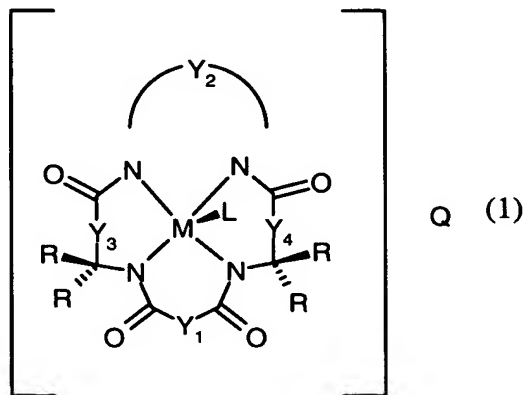


Claims

1. An oxidizing system comprising the three components

5 1) a macrocyclic metal complex of the general formula (I)



10 where

Y<sub>1</sub>, Y<sub>3</sub> and Y<sub>4</sub> are each independently a single bond or a bridge member which contains 1, 2 or 3 carbon atoms in the bridge,

15 Y<sub>2</sub> is a bridge member having at least 1 carbon atom in the bridge,

R is independently in each occurrence hydrogen, alkyl, cycloalkyl, cycloalkenyl, alkenyl, aryl, alkynyl, alkylaryl, halogen, alkoxy, phenoxy, CH<sub>2</sub>CF<sub>3</sub> or CF<sub>3</sub> or two R radicals which are bound to the same carbon atom combine to form a substituted or unsubstituted benzene, cycloalkyl or cycloalkenyl ring, the carbon atom to which the two R radicals are bound being part of the benzene, cycloalkyl or cycloalkenyl ring,

25

- M is a transition metal in the oxidation states I, II, III, IV, V or VI or is selected from groups 6, 7, 8, 9, 10 and 11 of the periodic table,
- 5 Q is a counterion which balances the charge of the macrocyclic metal complex on a stoichiometric basis, and
- L is a further ligand.
- 10 2) an oxidizing agent, and
- 3) an oxidation-enhancing compound.
2. The oxidizing system according to claim 1 which is characterized in that in  
15 the general formula (1)
- Y<sub>1</sub>, Y<sub>3</sub> and Y<sub>4</sub> are each independently a (-CH<sub>2</sub>)<sub>x</sub> group, where x is 1, 2 or 3 and one or more hydrogen atoms in the (-CH<sub>2</sub>)<sub>x</sub> group may be substituted by an R<sup>i</sup> radical, R<sup>i</sup> being alkyl, cycloalkyl, cycloalkenyl, alkenyl, aryl, alkynyl, alkylaryl, halogen, alkoxy or phenoxy, or two R<sup>i</sup> radicals which are bound to two adjacent carbon atoms of the (-CH<sub>2</sub>)<sub>x</sub> group combine to form a benzene, cycloalkyl or cycloalkenyl ring which may contain one or more hetero atoms, preferably oxygen, sulfur or nitrogen.
- 20
- 25 3. The oxidizing system according to claim 1 or 2 which is characterized in that in the general formula (1)
- Y<sub>2</sub> is a bridge member having 1, 2 or 3 carbon atoms in the bridge, preferably a (-CH<sub>2</sub>)<sub>y</sub> group, where y is 1 or 2 and one or more hydrogen atoms in the (-CH<sub>2</sub>)<sub>x</sub> group may be substituted by an R<sup>ii</sup> radical, R<sup>ii</sup> being alkyl, cycloalkyl, cycloalkenyl, alkenyl, aryl, alkynyl, alkylaryl, halogen, alkoxy or phenoxy, or two R<sup>ii</sup> radicals which are bound to two adjacent carbon atoms of the (-CH<sub>2</sub>)<sub>x</sub> group combine to form an optionally substituted benzene, cycloalkyl or
- 30

cycloalkenyl ring which may contain one or more hetero atoms, preferably oxygen, sulfur or nitrogen, preferably a benzene ring which may be substituted by electron-donating or electron-withdrawing radicals.

5

4. The oxidizing system according to one or more of claims 1-3 which is characterized in that in the general formula (1)

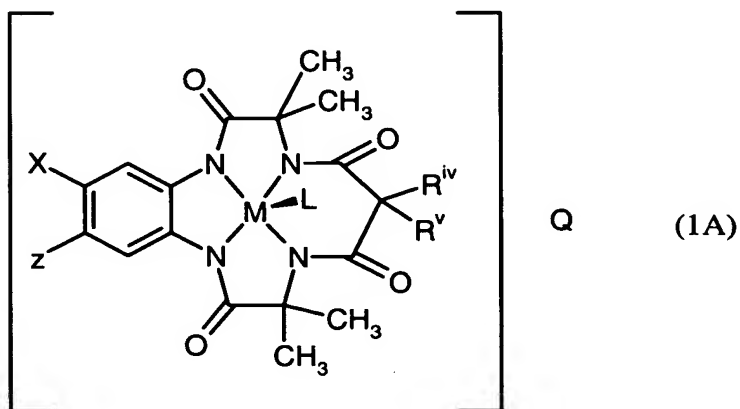
10 the R radicals are each independently hydrogen, C<sub>1</sub>-C<sub>8</sub>-alkyl, C<sub>3</sub>-C<sub>8</sub>-cycloalkyl, C<sub>4</sub>-C<sub>12</sub>-cycloalkenyl, C<sub>2</sub>-C<sub>8</sub>-alkenyl, C<sub>6</sub>-C<sub>14</sub>-aryl, C<sub>2</sub>-C<sub>12</sub>-alkynyl, C<sub>1</sub>-C<sub>12</sub>-alkylaryl, halogen, alkoxy, phenoxy, CH<sub>2</sub>CF<sub>3</sub> or CF<sub>3</sub> or two R radicals which are bound to the same carbon atom combine to form a substituted or unsubstituted benzene, C<sub>3</sub>-C<sub>8</sub>-cycloalkyl or C<sub>4</sub>-C<sub>12</sub>-cycloalkenyl ring, the carbon atom to which the two R radicals are bound being part of the benzene, 15 cycloalkyl or cycloalkenyl ring.

5. The oxidizing system according to one or more of claims 1-4 which is characterized in that in the general formula (1) M represents Cr, Mo, W, Mn, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd and/or Pt or mixtures of metals of the 20 aforementioned oxidation states or from the identified groups of the periodic table.

6. The oxidizing system according to one or more of claims 1-5 which is characterized in that in the general formula (1) Q is an alkali metal counterion, preferably potassium, lithium or sodium, NR<sup>iii</sup><sub>4</sub><sup>+</sup> or PR<sup>iii</sup><sub>4</sub><sup>+</sup>, where 25 every R<sup>iii</sup> is independently hydrogen, alkyl, aryl, alkylaryl, alkenyl or joins to form a cycloalkyl, cycloalkenyl or an aryl ring which optionally contains one or more hetero atoms, preferably oxygen, sulfur or nitrogen.

- 30 7. The oxidizing system according to one or more of claims 1-6 which is characterized in that in the general formula (1) L is a labile ligand, preferably H<sub>2</sub>O, Cl or CN.

8. The oxidizing system according to claim 1 which is characterized in that a macrocyclic metal complex used has the general formula (1A)



5

where

X and Z are each independently hydrogen, electron-donating or electron-withdrawing groups,

10

$R^{iv}$  and  $R^v$  are each independently hydrogen, alkyl, cycloalkyl, cycloalkenyl, alkenyl, aryl, alkynyl, alkylaryl, halogen, alkoxy or phenoxy radicals or combine to form a cycloalkyl or cycloalkenyl ring which may contain one or more hetero atoms,

15

M is a transition metal of the oxidation states I, II, III, IV, V or VI or is selected from groups 6, 7, 8, 9, 10 or 11 of the periodic table,

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Q is a counterion which balances the charge of the macrocyclic metal complex on a stoichiometric basis, and

L is a further ligand.

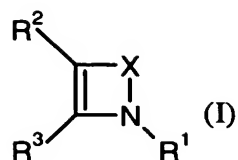
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9. The oxidizing system according to claim 8 which is characterized in that X and Z in the general formula (1A) are each independently halogen, preferably

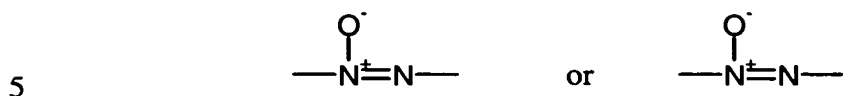
chlorine, bromine or iodine,  $\text{SO}_3^-$ ,  $\text{OSO}_3^-$ ,  $\text{OSO}_3\text{R}^{\text{vi}}$  (where  $\text{R}^{\text{vi}}$  is hydrogen, alkyl, aryl or alkylaryl),  $\text{NO}_2^-$ ,  $\text{C}_1$ - $\text{C}_8$ -alkoxy, preferably methoxy, ethoxy, propoxy and butoxy,  $\text{C}_1$ - $\text{C}_8$ -alkyl, preferably methyl, ethyl, propyl, n-butyl and tert-butyl, or hydrogen.

5

10. The oxidizing system according to claim 8 or 9 which is characterized in that in the macrocyclic metal complex of the general formula (1A)  $\text{R}^{\text{iv}}$  and  $\text{R}^{\text{v}}$  are each independently hydrogen, alkyl, preferably  $\text{C}_1$ - $\text{C}_5$ -alkyl, more preferably both identically methyl or ethyl, cycloalkyl, cycloalkenyl, alkenyl, aryl, alkynyl, halogen, alkoxy or phenoxy radicals or combine to form a cycloalkyl ring, especially a cyclopentyl or cyclohexyl ring, or a cycloalkenyl ring, the cycloalkyl or cycloalkenyl ring optionally containing one or more hetero atoms, preferably oxygen, sulfur or nitrogen.
10. 11. The oxidizing system according to one or more of claims 1-10 which is characterized in that the oxidizing agent comprises hydrogen peroxide, hydrogen peroxide adducts, preferably alkali metal, especially sodium, lithium or potassium, carbonate peroxyhydrate, urea peroxide or compounds capable of releasing or generating hydrogen peroxide in aqueous solution, preferably alkali metal, especially sodium, potassium or lithium perborate (as mono- or tetrahydrate), organic peroxides, preferably benzoyl or cumene hydroperoxides, persulfates, preferably peroxymonosulfate or Caro's acid, perphosphates or persilicates.
15. 12. The oxidizing system according to one or more of claims 1-11 which is characterized in that the oxidation-enhancing compounds ("mediator") are aliphatic, cycloaliphatic, heterocyclic or aromatic compounds having at least one OH, NO, NOH, HRN-OH functionality or mixtures thereof.
20. 13. The oxidizing system according to one or more of claims 1-12 which is characterized in that the oxidation-enhancing compounds are compounds of the general formula (I)
25. 14. The oxidizing system according to one or more of claims 1-13 which is characterized in that the oxidizing agent comprises hydrogen peroxide, hydrogen peroxide adducts, preferably alkali metal, especially sodium, lithium or potassium, carbonate peroxyhydrate, urea peroxide or compounds capable of releasing or generating hydrogen peroxide in aqueous solution, preferably alkali metal, especially sodium, potassium or lithium perborate (as mono- or tetrahydrate), organic peroxides, preferably benzoyl or cumene hydroperoxides, persulfates, preferably peroxymonosulfate or Caro's acid, perphosphates or persilicates.
30. 15. The oxidizing system according to one or more of claims 1-14 which is characterized in that the oxidation-enhancing compounds are compounds of the general formula (I).



where X represents  $(-\text{N}=\text{N}-)$ ,  $(-\text{N}=\text{CR}^4-)_p$ ,  $(-\text{CR}^4=\text{N}-)_p$ ,  $(-\text{CR}^5=\text{CR}^6)_p$ ,

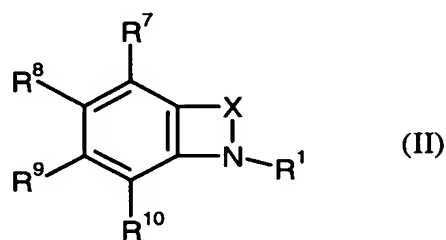


and p is 1 or 2,

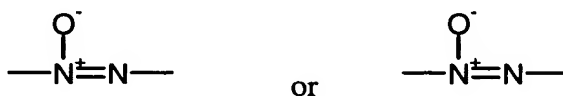
where the radicals  $\text{R}^1$  to  $\text{R}^6$  be the same or different and each independently denote hydrogen, halogen, hydroxyl, formyl, carboxyl and also salts and esters thereof, amino, nitro,  $\text{C}_1$ - $\text{C}_{12}$ -alkyl,  $\text{C}_1$ - $\text{C}_6$ -alkyloxy, carbonyl- $\text{C}_1$ - $\text{C}_6$ -alkyl, phenyl, sulfo and also esters and salts thereof, sulfamoyl, carbamoyl, phospho, phosphono, phosphonooxy and also salts and esters thereof, where the amino, carbamoyl and sulfamoyl groups of the radicals  $\text{R}^1$  to  $\text{R}^6$  may be unsubstituted or singly or doubly hydroxyl,  $\text{C}_1$ - $\text{C}_3$ -alkyl or  $\text{C}_1$ - $\text{C}_3$ -alkoxy substituted, and where the radicals  $\text{R}^2$  and  $\text{R}^3$  may combine to form a conjoint group -A- and -A- is  $(-\text{CR}^7=\text{CR}^8-\text{CR}^9=\text{CR}^{10}-)$  or  $(-\text{CR}^{10}=\text{CR}^9-\text{CR}^8=\text{CR}^7-)$ , where the radicals  $\text{R}^7$  to  $\text{R}^{10}$  are the same or different and each independently denote hydrogen, halogen, hydroxyl, formyl, carboxyl and also salts and esters thereof, amino, nitro,  $\text{C}_1$ - $\text{C}_{12}$ -alkyl,  $\text{C}_1$ - $\text{C}_6$ -alkyloxy, carbonyl- $\text{C}_1$ - $\text{C}_5$ -alkyl, phenyl, aryl, sulfo and also esters and salts thereof, sulfamoyl, carbamoyl, phospho, phosphono, phosphonooxy and also salts and esters thereof, where the amino, carbamoyl and sulfamoyl groups of the radicals  $\text{R}^7$  to  $\text{R}^{10}$  may be unsubstituted or singly or doubly hydroxyl,  $\text{C}_1$ - $\text{C}_3$ -alkyl or  $\text{C}_1$ - $\text{C}_3$ -alkoxy substituted, and where the  $\text{C}_1$ - $\text{C}_{12}$ -alkyl,  $\text{C}_1$ - $\text{C}_6$ -alkyloxy, carbonyl- $\text{C}_1$ - $\text{C}_6$ -alkyl, phenyl and aryl groups of the radicals  $\text{R}^7$  to  $\text{R}^{10}$  may be unsubstituted or singly or multiply  $\text{R}^{11}$  substituted and where  $\text{R}^{11}$  denotes hydrogen, halogen, hydroxyl, formyl, carboxyl and also salts and esters thereof, amino, nitro,  $\text{C}_1$ - $\text{C}_{12}$ -alkyl,  $\text{C}_1$ - $\text{C}_6$ -alkyloxy, carbonyl- $\text{C}_1$ - $\text{C}_6$ -alkyl, phenyl, aryl, sulfo and also esters and

salts thereof, where the carbamoyl, sulfamoyl and amino groups of the  $R^{11}$  radical may be unsubstituted or singly or doubly  $R^{12}$  substituted and  $R^{12}$  denotes hydrogen, hydroxyl, formyl, carboxyl and also salts and esters thereof, amino, nitro,  $C_1$ - $C_{12}$ -alkyl,  $C_1$ - $C_6$ -alkyloxy, carbonyl- $C_1$ - $C_6$ -alkyl, phenyl or aryl.

14. The oxidizing system according to one or more of claims 1-12 which is characterized in that the oxidation-enhancing compounds are compounds of the general formula (II)



where X represents  $(-N=N-)$ ,  $(-N=CR^4-)_p$ ,  $(-CR^4=N-)_p$ ,  $(-CR^5=CR^6)_p$ ,



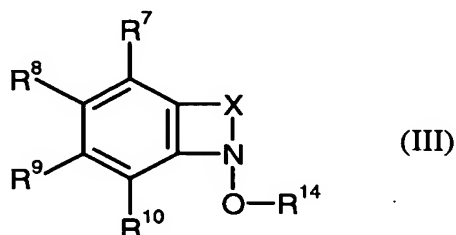
and p is 1 or 2

where the radicals  $R^1$  and  $R^4$  to  $R^{10}$  are the same or different and denote

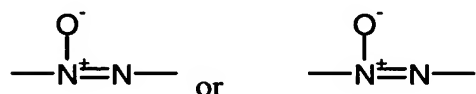
hydrogen, halogen, hydroxyl, formyl, carboxyl and also salts and esters thereof, amino, nitro,  $C_1$ - $C_{12}$ -alkyl,  $C_1$ - $C_5$ -alkyloxy, carbonyl- $C_1$ - $C_6$ -alkyl, phenyl, aryl, sulfo and also esters and salts thereof, sulfamoyl, carbamoyl, phospho, phosphono, phosphonooxy and also salts and esters thereof, where the amino, carbamoyl and sulfamoyl groups of the radicals  $R^1$  and  $R^4$  to  $R^{10}$  may be unsubstituted or singly or doubly hydroxyl,  $C_1$ - $C_3$ -alkyl or  $C_1$ - $C_3$ -alkoxy substituted and where the  $C_1$ - $C_{12}$ -alkyl,  $C_1$ - $C_6$ -alkyloxy, carbonyl- $C_1$ - $C_6$ -alkyl, phenyl, aryl and aryl- $C_1$ - $C_6$ -alkyl groups of the radicals  $R^1$  and  $R^4$  to  $R^{10}$  may be unsubstituted or singly or multiply  $R^{12}$  substituted

and where  $R^{12}$  denotes hydrogen, halogen, hydroxyl, formyl, carboxyl and also salts and esters thereof, amino, nitro,  $C_1$ - $C_{12}$ -alkyl,  $C_1$ - $C_6$ -alkyloxy, carbonyl- $C_1$ - $C_6$ -alkyl, phenyl, aryl, sulfo, esters and salts thereof, sulfeno, sulfino, where the carbamoyl, sulfamoyl, amino groups of the  $R^{12}$  radical may be unsubstituted or singly or doubly  $R^{13}$  substituted and where  $R^{13}$  denotes hydrogen, hydroxyl, formyl, carboxyl and also salts and esters thereof, amino, nitro,  $C_1$ - $C_{12}$ -alkyl,  $C_1$ - $C_6$ -alkyloxy, carbonyl- $C_1$ - $C_6$ -alkyl, phenyl or aryl.

15. The oxidizing system according to one or more of claims 1-12 which is characterized in that the oxidation-enhancing compounds are compounds of the general formula (III)



- 15 where X represents  $(-N=N-)$ ,  $(-N=CR^4-)_m$ ,  $(-CR^4=N-)_m$ ,  $(-CR^5=CR^6-)_m$ ,



and m is 1 or 2

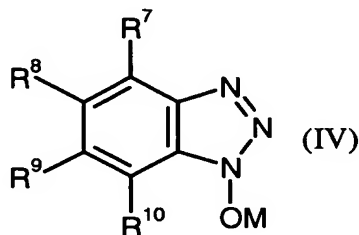
where the radicals  $R^7$  to  $R^{10}$  and  $R^4$  to  $R^6$  are each as defined for the formula (II) and

- $R^{14}$  denotes  $-M$ , where M denotes hydrogen, alkali, preferably lithium, sodium or potassium, alkaline earth, preferably calcium or magnesium, ammonium,  $C_1$ - $C_4$ -alkylammonium or  $C_1$ - $C_4$ -alkanolammonium,  $C_1$ - $C_{10}$ -alkyl,  $C_1$ - $C_{10}$ -alkylcarbonyl, where  $C_1$ - $C_{10}$ -alkyl and  $C_1$ - $C_{10}$ -alkylcarbonyl may be unsubstituted or singly or multiply  $R^{15}$  substituted, where  $R^{15}$  denotes hydrogen, halogen, hydroxyl, formyl, carboxyl



and also salts and esters thereof, amino, nitro, C<sub>1</sub>-C<sub>12</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-alkyloxy, carbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, phenyl, sulfo, and also esters and salts thereof, sulfamoyl, carbamoyl, phospho, phosphono, phosphonooxy and also salts and esters thereof, where the amino, carbamoyl and sulfamoyl groups of the R<sup>15</sup> radical may be unsubstituted or singly or doubly hydroxyl, C<sub>1</sub>-C<sub>3</sub>-alkyl or C<sub>1</sub>-C<sub>3</sub>-alkoxy substituted.

16. The oxidizing system according to one or more of claims 1-12 which is characterized in that the oxidation-enhancing compounds are compounds of the general formula (IV)



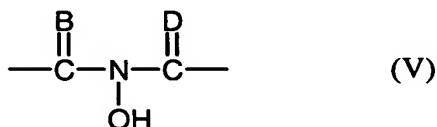
where

- M denotes hydrogen, alkali, preferably lithium, sodium or potassium, alkaline earth, preferably calcium or magnesium, ammonium, C<sub>1</sub>-C<sub>4</sub>-alkylammonium or C<sub>1</sub>-C<sub>4</sub>alkanolammonium, and

the radicals R<sup>7</sup> to R<sup>10</sup> are the same or different and each independently denote hydrogen, halogen, hydroxyl, formyl, carboxyl and also salts and esters thereof, amino, nitro, C<sub>1</sub>-C<sub>12</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-alkyloxy, carbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, phenyl, sulfo and also esters and salts thereof, sulfamoyl, carbamoyl, phospho, phosphono, phosphonooxy and also salts and esters thereof, where the amino, carbamoyl and sulfamoyl groups of the radicals R<sup>7</sup> to R<sup>10</sup> may be unsubstituted or singly or doubly hydroxyl, C<sub>1</sub>-C<sub>3</sub>-alkyl or C<sub>1</sub>-C<sub>3</sub>-alkoxy substituted, and where the C<sub>1</sub>-C<sub>12</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-alkyloxy, carbonyl-C<sub>1</sub>-C<sub>5</sub>-alkyl, phenyl and aryl groups of the radicals R<sup>7</sup> to R<sup>10</sup> may be unsubstituted or singly or multiply R<sup>16</sup> substituted and where R<sup>16</sup> denotes hydrogen, halogen, hydroxyl, formyl, carboxyl and also salts and esters thereof, amino, nitro, C<sub>1</sub>-C<sub>12</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-alkyloxy, carbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl,

phenyl, aryl, sulfo, salts or esters thereof, sulfeno, sulfino, where the carbamoyl, sulfamoyl and amino groups of the  $R^{16}$  radical may be unsubstituted or singly or doubly  $R^{17}$  substituted and  $R^{17}$  denotes hydrogen, hydroxyl, formyl, carboxyl and also salts and esters thereof, amino, nitro,  $C_1$ - $C_{12}$ -alkyl,  $C_1$ - $C_6$ -alkyloxy, carbonyl- $C_1$ - $C_6$ -alkyl, phenyl or aryl.

17. The oxidizing system according to one or more of claims 1-12 which is characterized in that the oxidation-enhancing compounds are cyclic N-hydroxy compounds comprising at least one five- or six-membered ring containing the structure identified in the general formula (V)

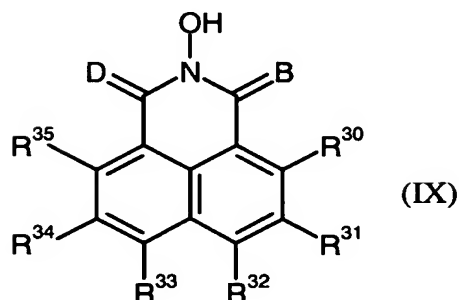
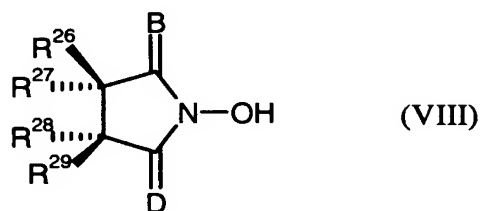
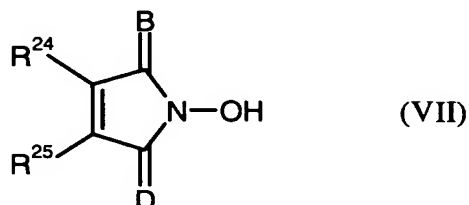
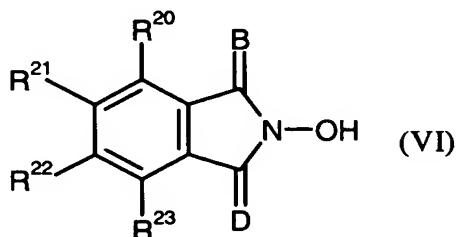


and also salts, ethers or esters thereof, where

B and D are the same or different and denote oxygen, sulfur or  $NR^{18}$ , where

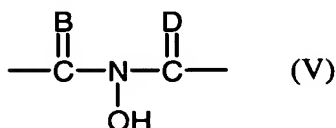
$R^{18}$  represents hydrogen, hydroxyl, formyl, carbamoyl, sulfo, esters or salts thereof, sulfamoyl, nitro, amino, phenyl, aryl- $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_{12}$ -alkyl,  $C_1$ - $C_5$ -alkoxy,  $C_1$ - $C_{10}$ -carbonyl, carbonyl- $C_1$ - $C_6$ -alkyl, phospho, phosphono or phosphonooxy and also esters or salts thereof, where the carbamoyl, sulfamoyl, amino and phenyl radicals may be unsubstituted or singly or multiply  $R^{19}$  substituted and the aryl- $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_{12}$ -alkyl,  $C_1$ - $C_5$ -alkoxy,  $C_1$ - $C_{10}$ -carbonyl and carbonyl- $C_1$ - $C_6$ -alkyl radicals may be saturated or unsaturated, branched or unbranched and may similarly be singly or multiply  $R^{19}$  substituted, where  $R^{19}$  in each occurrence is the same or different and denotes hydroxyl, formyl or carboxyl and also esters or salts thereof, carbamoyl or sulfo, esters or salts thereof, sulfamoyl, nitro, amino, phenyl,  $C_1$ - $C_5$ -alkyl or  $C_1$ - $C_5$ -alkoxy.

18. The oxidizing system according to one or more of claims 1-12 which is characterized in that the oxidation-enhancing compounds are compounds of the general formulae (VI), (VII), (VIII) or (IX)

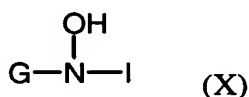


- 10 where B and D are each as defined for the general formula (V) and the radicals  $R^{20}$ - $R^{35}$  are the same or different and represent halogen, carboxyl and salts or esters thereof or have the meanings defined for  $R^{18}$ , although  $R^{26}$  and  $R^{27}$  on the one hand and  $R^{28}$  and  $R^{29}$  on the other must not both denote hydroxyl or amino and optionally any two of the substituents  $R^{20}$ - $R^{23}$ ,  $R^{24}$ - $R^{25}$ ,  $R^{26}$ - $R^{29}$ ,  $R^{30}$ - $R^{35}$  may be linked together to form a ring -E-, where -E- represents
- 15

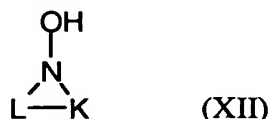
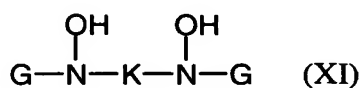
$(-\text{CH}=\text{CH})_n$  with  $n = 1$  to  $3$ ,  $-\text{CH}=\text{CH}-\text{CH}=\text{N}-$  or



- 5 and where optionally the radicals  $\text{R}^{26}-\text{R}^{29}$  may also be bonded together by one or two bridge elements  $-\text{F}-$ , where  $-\text{F}-$  in each occurrence is the same or different and has one of the following meanings:  $-\text{O}-$ ,  $-\text{S}-$ ,  $-\text{CH}_2-$ ,  $-\text{CR}^{36}=\text{CR}^{37}-$ , where  $\text{R}^{36}$  and  $\text{R}^{37}$  are the same or different and have the meaning of  $\text{R}^{20}$ .
- 10 19. The oxidizing system according to one or more of claims 1-12 which is characterized in that the oxidation-enhancing compounds are compounds of the general formulae (VI), (VII), (VIII) or (IX) wherein B and D denote oxygen or sulfur.
- 15 20. The oxidizing system according to one or more of claims 1-12 which is characterized in that the oxidation-enhancing compounds are compounds of the general formula (X), (XI) or (XII)



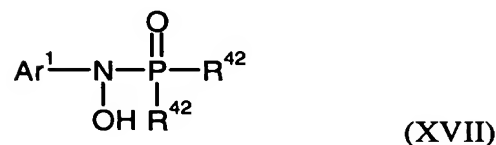
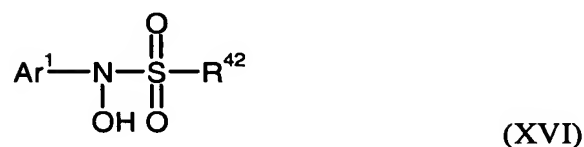
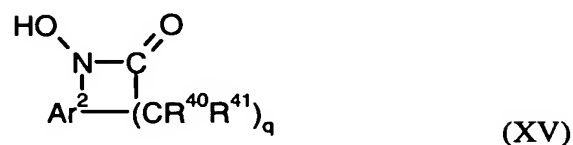
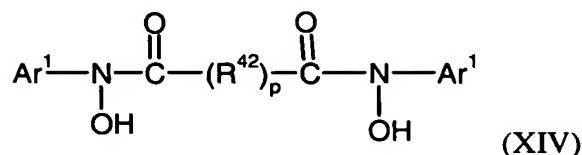
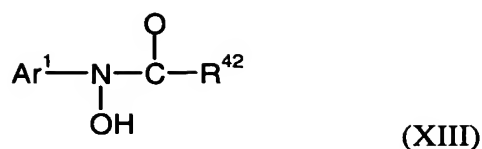
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25 and also salts, ethers or esters thereof, where

G is a monovalent homo- or heteroaromatic mono- or binuclear radical and

- L is a bivalent homo- or heteroaromatic mono- or binuclear radical and where these aromatic radicals may be substituted by one or more, identical or different  $R^{38}$  radicals, where  $R^{38}$  may represent halogen, hydroxyl, formyl, cyano, carbamoyl, carboxyl, esters or salts thereof, sulfo, esters or salts thereof, sulfamoyl, nitro, nitroso, amino, phenyl, aryl- $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_{12}$ -alkyl,  $C_1$ - $C_5$ -alkoxy,  $C_1$ - $C_{10}$ -carbonyl, carbonyl- $C_1$ - $C_6$ -alkyl, phospho, phosphono, phosphonooxy, esters or salts thereof, where the carbamoyl, sulfamoyl, amino and phenyl radicals may in turn be unsubstituted or singly or multiply  $R^{39}$  substituted and the aryl- $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_{12}$ -alkyl,  $C_1$ - $C_5$ -alkoxy,  $C_1$ - $C_{10}$ -carbonyl, carbonyl- $C_1$ - $C_6$ -alkyl radicals may be saturated or unsaturated, branched or unbranched and may similarly be singly or multiply  $R^{39}$  substituted, where  $R^{39}$  in each occurrence is the same or different and denotes hydroxyl, formyl, cyano, carboxyl, esters or salts thereof, carbamoyl, sulfo, sulfamoyl, nitro, nitroso, amino, phenyl,  $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_5$ -alkoxy,  $C_1$ - $C_5$ -alkylcarbonyl and two  $R^{38}$  or  $R^{39}$  radicals at a time may be linked together pairwise via a  $[-CR^{40}R^{41}-]_m$  bridge, where m is 0,1,2, 3 or 4, and  $R^{40}$  and  $R^{41}$  are the same or different and denote carboxyl, esters or salts thereof, phenyl,  $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_5$ -alkoxy or  $C_1$ - $C_5$ -alkylcarbonyl and one or more nonadjacent  $[-CR^{40}R^{41}-]$  groups may be replaced by O, S or an optionally  $C_1$ - $C_5$ -alkyl-substituted imino radical and two adjacent  $[-CR^{40}R^{41}-]$  groups by a  $[-CR^{40}=CR^{41}]$  group and denotes a monovalent acid radical present in amidic form of acids selected from the group consisting of carboxylic acids having up to 20 carbon atoms, carbonic acid, half esters of carbonic acid or of carbamic acid, sulfonic acid, phosphonic acid, phosphoric acid, monoesters of phosphoric acid, and diesters of phosphoric acid and K is a divalent acid radical present in amidic form of acids selected from the group consisting of mono- and dicarboxylic acids having up to 20 carbon atoms, carbonic acid, sulfonic acid, phosphonic acid, phosphoric acid or monoesters of phosphoric acid.
21. The oxidizing system according to one or more of claims 1-12 which is characterized in that the oxidation-enhancing compounds are compounds of the general formula (XIII), (XIV), (XV), (XVI) or (XVII)



5

and also salts, ethers or esters thereof, where

10  $\text{Ar}^1$  denotes a univalent homo- or heteroaromatic mononuclear aryl radical and

15  $\text{Ar}^2$  denotes a bivalent homo- or heteroaromatic mononuclear aryl radical which may each be substituted by one or more, identical or different  $\text{R}^{44}$  radicals, where  $\text{R}^{44}$  represents hydroxyl, cyano, carboxyl, esters or salts thereof, sulfo, esters or salts thereof, nitro, nitroso, amino,  $\text{C}_1\text{-C}_{12}$ -alkyl,  $\text{C}_1\text{-C}_5$ -alkoxy,  $\text{C}_1\text{-C}_{10}$ -carbonyl, carbonyl or  $\text{C}_1\text{-C}_6$ -alkyl, where the amino radicals may be unsubstituted or singly or multiply  $\text{R}^{45}$  substituted and the  $\text{C}_1\text{-C}_5$ -alkyl,  $\text{C}_1\text{-C}_5$ -alkoxy,  $\text{C}_1\text{-C}_{10}$ -carbonyl and carbonyl- $\text{C}_1\text{-C}_6$ -alkyl radicals may be saturated or unsaturated, 20 branched or unbranched and may similarly be singly or multiply  $\text{R}^{45}$  substituted, where  $\text{R}^{45}$  in each occurrence is the same or different and denotes hydroxyl, carboxyl, esters or salts thereof, sulfo, nitro, amino,  $\text{C}_1\text{-C}_5$ -alkyl,  $\text{C}_1\text{-C}_5$ -alkoxy or  $\text{C}_1\text{-C}_5$ -alkylcarbonyl and two  $\text{R}^{44}$  radicals

at a time may be linked together pairwise via a  $[-CR^{40}R^{41}-]_m$  bridge where m is 0, 1, 2, 3 or 4, and where

5  $R^{40}$  and  $R^{41}$  are each as defined in claim 19 and one or more nonadjacent  $[-CR^{40}R^{41}-]$  groups may be replaced by O, S or an optionally  $C_1$ - $C_5$ -alkyl-substituted imino radical and two adjacent  $[-CR^{40}R^{41}-]$  groups may be replaced by a  $[-CR^{40}=CR^{41}-]$  group, and where

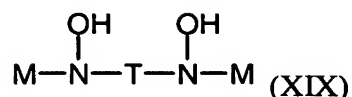
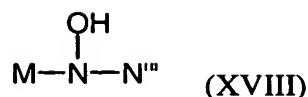
10  $R^{42}$  in each occurrence is the same or different and denotes hydrogen, phenyl, aryl- $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_{12}$ -alkyl,  $C_1$ - $C_5$ -alkoxy or  $C_1$ - $C_{10}$ -carbonyl, where the phenyl radicals may be unsubstituted or singly or multiply  $R^{46}$  substituted and the aryl- $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_{12}$ -alkyl,  $C_1$ - $C_5$ -alkoxy,  $C_1$ - $C_5$ -carbonyl radicals may be saturated  
15 or unsaturated, branched or unbranched and may similarly be singly or multiply  $R^{46}$  substituted, where

$R^{46}$  in each occurrence is the same or different and denotes hydroxyl, formyl, cyano, carboxyl, esters or salts thereof, carbamoyl, sulfo,  
20 sulfamoyl, nitro, nitroso, amino, phenyl,  $C_1$ - $C_5$ -alkyl or  $C_1$ - $C_5$ -alkoxy and  $R^{43}$  denotes divalent radicals ortho-, meta-, para-phenylene, aryl- $C_1$ - $C_6$ -alkyl,  $C_1$ - $C_{12}$ -alkylene or  $C_1$ - $C_5$ -alkylenedioxy, where the phenylene radicals may be unsubstituted or singly or multiply  $R^{46}$  substituted and the aryl- $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_{12}$ -alkyl and  $C_1$ - $C_5$ -alkoxy  
25 radicals may be saturated or unsaturated, branched or unbranched and may be singly or multiply  $R^{46}$  substituted, where

p denotes 0 or 1 and

30 q denotes an integer from 1 to 3.

22. The oxidizing system according to one or more of claims 1-12 which is characterized in that the oxidation-enhancing compounds are compounds of the general formula (XVIII) or (XIX),



5 and also salts, ethers or esters thereof, where

M in each occurrence is the same or different and denotes a univalent linear or branched, cyclic or polycyclic, saturated or unsaturated C<sub>1</sub>-C<sub>2</sub>-alkyl radical and where this alkyl radical may be substituted by one or more R<sup>48</sup> radicals, where R<sup>48</sup> in each occurrence is the same or different and denotes hydroxyl, mercapto, formyl, carbamoyl, carboxyl, esters or salts thereof, sulfo, esters or salts thereof, sulfamoyl, nitro, nitroso, amino, hydroxylamino, phenyl, C<sub>1</sub>-C<sub>5</sub>-alkoxy, C<sub>1</sub>-C<sub>10</sub>-carbonyl, phospho, phosphono or phosphonooxy and also esters or salts and where the carbamoyl, sulfamoyl, amino, hydroxylamino, mercapto and phenyl radicals may be unsubstituted or singly or multiply R<sup>48</sup> substituted and the C<sub>1</sub>-C<sub>5</sub>-alkoxy and C<sub>1</sub>-C<sub>10</sub>-carbonyl radicals may be saturated or unsaturated, branched or unbranched and may be singly or multiply R<sup>48</sup> substituted, where R<sup>48</sup> in each occurrence is the same or different and denotes hydroxyl, formyl, cyano, carboxyl, esters or salts thereof, carbamoyl, sulfo, salts or esters thereof, sulfamoyl, nitro, nitroso, amino, phenyl, benzoyl, C<sub>1</sub>-C<sub>5</sub>-alkyl, C<sub>1</sub>-C<sub>5</sub>-alkoxy or C<sub>1</sub>-C<sub>5</sub>-alkylcarbonyl and non-α-disposed methylene groups may be replaced by O, S or an optionally monosubstituted imino radical, and

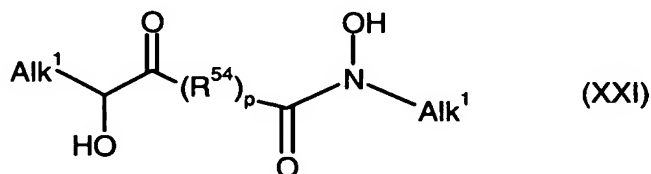
25 N''' denotes a monovalent acid radical in amidic form of acids which are aliphatic, mono- or binuclear aromatic or mono- or binuclear heteroaromatic carboxylic acids having 1-20 carbon atoms, carbonic acid, half esters of carbonic acid or of carbamic acid, sulfonic acid, phosphonic acid, phosphoric acid, monoesters of phosphoric acid or diesters of phosphoric acid, and

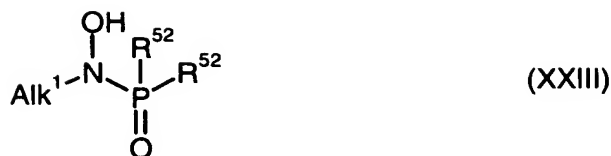
30

T denotes a bivalent acid radical in amidic form of acids which are aliphatic, mono- or binuclear aromatic or mono- or binuclear heteroaromatic



- dicarboxylic acids having 1-20 carbon atoms, carbonic acid, sulfonic acid, phosphonic acid, phosphoric acid or monoesters of phosphoric acid, and where alkyl radicals of the aliphatic acids N''' and T which are present in amidic form may be linear or branched, cyclic and/or polycyclic, saturated or unsaturated and contain 1-24 carbon atoms and are unsubstituted or singly or multiply R<sup>47</sup> substituted and where, furthermore, aryl and heteroaryl radicals of the aromatic or heteroaromatic acids N''' and T which are present in amidic form may be substituted by one or more R<sup>49</sup> radicals, where R<sup>49</sup> may be substituted, in which case R<sup>49</sup> in each occurrence is the same or different and denotes hydroxyl, mercapto, formyl, cyano, carbamoyl, carboxyl, esters or salts thereof, sulfo, esters or salts thereof, sulfamoyl, nitro, nitroso, amino, phenyl, aryl-C<sub>1</sub>-C<sub>5</sub>-alkyl, C<sub>1</sub>-C<sub>12</sub>-alkyl, C<sub>1</sub>-C<sub>5</sub>-alkoxy, C<sub>1</sub>-C<sub>10</sub>-carbonyl, phospho, phosphono or phosphonooxy and also esters or salts thereof and where the carbamoyl, sulfamoyl, amino, mercapto and phenyl radicals may be unsubstituted or singly or multiply R<sup>48</sup> substituted and the aryl-C<sub>1</sub>-C<sub>5</sub>-alkyl, C<sub>1</sub>-C<sub>12</sub>-alkyl-C<sub>1</sub>-C<sub>5</sub>-alkoxy, C<sub>1</sub>-C<sub>10</sub>-carbonyl radicals may be saturated or unsaturated, branched or unbranched and may be singly or multiply R<sup>48</sup> substituted.
23. The oxidizing system according to one or more of claims 1-12 which is characterized in that the oxidation-enhancing compounds are compounds of the general formulae (XX), (XXI), (XXII) or (XXIII)





and also salts, ethers or esters thereof, where

5        Alk<sup>1</sup> in each occurrence is the same or different and denotes a univalent linear or branched, cyclic or polycyclic, saturated or unsaturated C<sub>1</sub>-C<sub>10</sub>-alkyl radical,

10        where this alkyl radical may be substituted by one or more R<sup>50</sup> radicals, where R<sup>50</sup> in each occurrence is the same or different and denotes hydroxyl, formyl, carbamoyl, carboxyl, esters or salts thereof, sulfo, esters or salts thereof, sulfamoyl, nitro, nitroso, amino, hydroxylamino, phenyl, C<sub>1</sub>-C<sub>5</sub>-alkoxy, C<sub>1</sub>-C<sub>5</sub>-carbonyl and where the carbamoyl, sulfamoyl, amino, hydroxylamino and phenyl radicals may be unsubstituted or singly or  
15        multiply R<sup>51</sup> substituted and the C<sub>1</sub>-C<sub>5</sub>-alkoxy and C<sub>1</sub>-C<sub>10</sub>-carbonyl radicals may be saturated or unsaturated, branched or unbranched and may be singly or multiply R<sup>51</sup> substituted, where

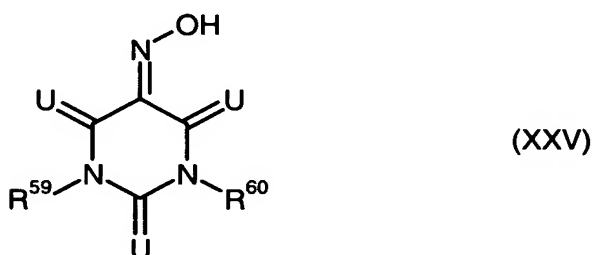
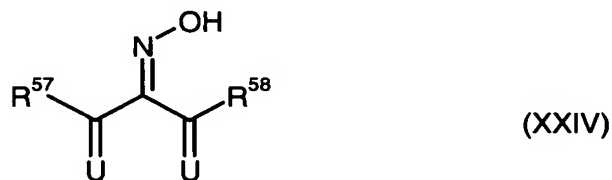
20        R<sup>51</sup> in each occurrence is the same or different and denotes hydroxyl, formyl, cyano, carboxyl, esters or salts thereof, carbamoyl, sulfo, salts or esters thereof, sulfamoyl, nitro, amino, phenyl, benzoyl, C<sub>1</sub>-C<sub>5</sub>-alkyl, C<sub>1</sub>-C<sub>5</sub>-alkoxy or C<sub>1</sub>-C<sub>5</sub>-alkylcarbonyl and non-α-disposed methylene groups may be replaced by O, S or an optionally monosubstituted imino radical, and where

25        R<sup>52</sup> denotes identical or different univalent radicals hydrogen, phenyl, pyridyl, furyl, pyrrolyl, thienyl, aryl C<sub>1</sub>-C<sub>5</sub>-alkyl, C<sub>1</sub>-C<sub>12</sub>-alkyl, C<sub>1</sub>-C<sub>10</sub>-alkoxy or C<sub>1</sub>-C<sub>10</sub>-carbonyl, where the phenyl, pyridyl, furyl, pyrrolyl and thienyl radicals may be unsubstituted or singly or multiply R<sup>53</sup> substituted and the aryl-C<sub>1</sub>-C<sub>5</sub>-alkyl, C<sub>1</sub>-C<sub>12</sub>-alkyl, C<sub>1</sub>-C<sub>5</sub>-alkoxy and C<sub>1</sub>-C<sub>10</sub>-carbonyl radicals may  
30        be saturated or unsaturated, branched or unbranched and may similarly be singly or multiply R<sup>53</sup> substituted, where

$R^{53}$  in each occurrence is the same or different and denotes hydroxyl, formyl, carboxyl, esters or salts thereof, carbamoyl, sulfo, esters and salts thereof, sulfamoyl, nitro, amino, phenyl,  $C_1$ - $C_5$ -alkyl or  $C_1$ - $C_5$ -alkoxy, and

5  $R^{54}$  denotes bivalent radicals phenylene, pyridylene, thienylene, furylene, pyrrolylene, aryl- $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_{12}$ -alkylene,  $C_1$ - $C_5$ -alkylenedioxy, where phenylene, pyridylene, thienylene, furylene and pyrrolylene may be unsubstituted or singly or multiply  $R^{53}$  substituted and the aryl- $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_{12}$ -alkyl,  $C_1$ - $C_5$ -alkoxy radicals may be saturated or unsaturated, branched  
10 or unbranched and may similarly be singly or multiply  $R^{53}$  substituted, where p denotes 0 or 1.

24. The oxidizing system according to one or more of claims 1-12 which is characterized in that the oxidation-enhancing compounds are compounds of  
15 the general formulae (XXIV) or (XXV)



20 and also salts, ethers or esters thereof, where

U in each occurrence is the same or different and denotes oxygen, sulfur or  $NR^{55}$ , where

25  $R^{55}$  denotes hydrogen, hydroxyl, formyl, carbamoyl, sulfo, esters or salts thereof, sulfamoyl, nitro, amino, phenyl, aryl- $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_{12}$ -alkyl,

C<sub>1</sub>-C<sub>5</sub>-alkoxy, C<sub>1</sub>-C<sub>10</sub>-carbonyl, carbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, phospho, phosphono or phosphonooxy and also esters or salts thereof,

where the carbamoyl, sulfamoyl, amino and phenyl radicals may be unsubstituted or singly or multiply R<sup>56</sup> substituted and the aryl-C<sub>1</sub>-C<sub>5</sub>-alkyl, C<sub>1</sub>-C<sub>10</sub>-alkyl, C<sub>1</sub>-C<sub>5</sub>-alkoxy, C<sub>1</sub>-C<sub>10</sub>-carbonyl and carbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl radicals may be saturated or unsaturated, branched or unbranched and may be singly or multiply R<sup>56</sup> substituted, where

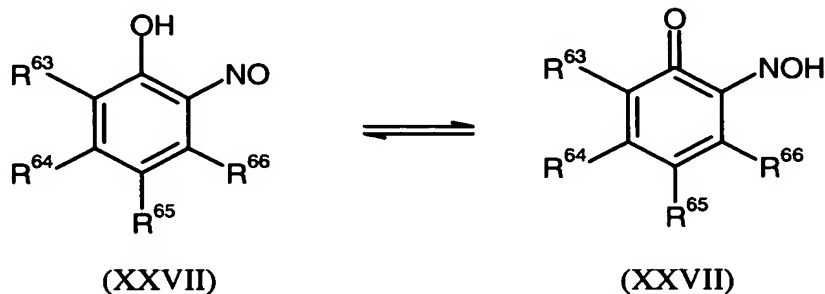
R<sup>56</sup> in each occurrence is the same or different and denotes hydroxyl, formyl, carboxyl, esters or salts thereof, carbamoyl, sulfo, esters or salts thereof, sulfamoyl, nitro, amino, phenyl, C<sub>1</sub>-C<sub>5</sub>-alkyl or C<sub>1</sub>-C<sub>5</sub>-alkoxy, and

the radicals R<sup>57</sup> and R<sup>58</sup> are the same or different and denote halogen or carboxyl and also esters or salts thereof, or have the meanings defined for R<sup>55</sup>, or are linked together to form a [-CR<sup>61</sup>R<sup>62</sup>]<sub>n</sub> ring, where n is 2, 3 or 4, and

R<sup>59</sup> and R<sup>60</sup> have the meanings defined for R<sup>55</sup>, and

R<sup>61</sup> and R<sup>62</sup> are the same or different and denote halogen or carboxyl and also esters or salts thereof, or have the meanings defined for R<sup>55</sup>.

25. The oxidizing system according to one or more of claims 1-12 which is characterized in that the oxidation-enhancing compounds are compounds of the general formulae (XXVI) or (XXVII)



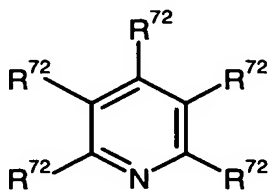
and also salts, ethers or esters thereof, where

$R^{63}$ ,  $R^{64}$ ,  $R^{65}$  and  $R^{66}$  are the same or different and denote hydrogen, halogen, hydroxyl, formyl, carbamoyl or carboxyl and also esters or salts thereof, sulfo, esters or salts thereof, sulfamoyl, nitro, nitroso, cyano, amino, phenyl, aryl- $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_{12}$ -alkyl,  $C_1$ - $C_5$ -alkoxy,  $C_1$ - $C_{10}$ -carbonyl, carbonyl- $C_1$ - $C_6$ -alkyl, phospho, phosphono or phosphonooxy and also esters or salts thereof, where the carbamoyl, sulfamoyl, amino and phenyl radicals may be unsubstituted or singly or multiply  $R^{67}$  substituted and the aryl- $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_{12}$ -alkyl,  $C_1$ - $C_5$ -alkoxy,  $C_1$ - $C_{10}$ -carbonyl, carbonyl- $C_1$ - $C_6$ -alkyl radicals may be saturated or unsaturated, branched or unbranched and may be singly or multiply  $R^{67}$  substituted, where

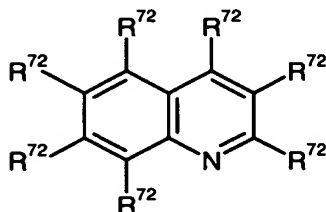
$R^{67}$  in each occurrence is the same or different and denotes hydroxyl, formyl or carboxyl and also esters or salts thereof, carbamoyl, sulfo, salts or esters thereof, sulfamoyl, nitro, nitroso, amino, phenyl,  $C_1$ - $C_5$ -alkyl or  $C_1$ - $C_5$ -alkoxy or the  $R^{63}$ ,  $R^{64}$ ,  $R^{65}$  and  $R^{66}$  radicals are linked together pairwise to form a  $[-CR^{68}R^{69}-]_m$  ring, where m is an integer from 1 to 4, or to form a  $[-CR^{70}=CR^{71}-]_n$  ring, where n is an integer from 1 to 3, and

$R^{68}$ ,  $R^{69}$ ,  $R^{70}$  and  $R^{71}$  are the same or different and have the meanings defined for  $R^{63}$  to  $R^{66}$ .

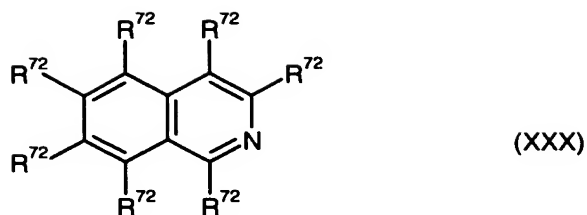
26. The oxidizing system according to one or more of claims 1-12 which is characterized in that the oxidation-enhancing compounds are compounds of the general formulae (XXVIII), (XXIX) or (XXX)



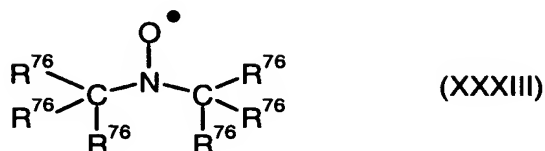
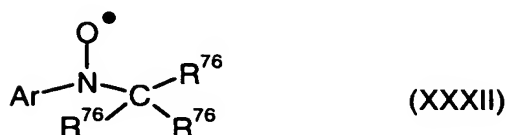
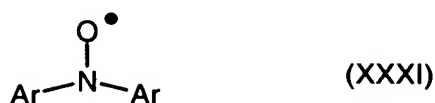
(XXVIII)



(XXIX)



- and also tautomers, salts, ethers or esters thereof, where in the formulae (XXVIII), (XXIX) and (XXX) two mutually ortho- or para-disposed  $R^{72}$  radicals denote hydroxyl and nitroso or hydroxyl and mercapto or nitroso and amino and the other  $R^{72}$  radicals are the same or different and denote hydrogen, halogen, hydroxyl, mercapto, formyl, cyano, carbamoyl or carboxyl and also esters and salts thereof, sulfo, esters and salts thereof, sulfamoyl, nitro, nitroso, amino, phenyl, aryl- $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_{12}$ -alkyl,  $C_1$ - $C_5$ -alkoxy,  $C_1$ - $C_{10}$ -carbonyl, carbonyl- $C_1$ - $C_6$ -alkyl, phospho, phosphono or phosphonooxy and also esters and salts thereof and where the carbamoyl, sulfamoyl, amino, mercapto and phenyl radicals may be unsubstituted or singly or multiply  $R^{73}$  substituted and the aryl- $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_{12}$ -alkyl,  $C_1$ - $C_5$ -alkoxy,  $C_1$ - $C_{10}$ -carbonyl, carbonyl- $C_1$ - $C_6$ -alkyl radicals may be saturated or unsaturated, branched or unbranched and may be singly or multiply  $R^{73}$  substituted, where  $R^{73}$  in each occurrence is the same or different and denotes hydroxyl, formyl, cyano or carboxyl and also esters or salts thereof, carbamoyl, sulfo, sulfamoyl, nitro, nitroso, amino, phenyl,  $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_5$ -alkoxy or  $C_1$ - $C_5$ -alkylcarbonyl and two  $R^{72}$  radicals at a time or two  $R^{73}$  radicals at a time or  $R^{72}$  and  $R^{73}$  may be linked together pairwise via a  $[-CR^{74}R^{75}-]_m$  bridge, where  $m$  is 1, 2, 3 or 4, and  $R^{74}$  and  $R^{75}$  are the same or different and denote carboxyl, esters or salts thereof, phenyl,  $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_5$ -alkoxy or  $C_1$ - $C_5$ -alkylcarbonyl and one or more nonadjacent  $[-CR^{74}R^{75}-]$  groups may be replaced by O, S or an optionally  $C_1$ - $C_5$ -alkylsubstituted imino radical and two adjacent  $[-CR^{74}R^{75}-]$  groups may be replaced by one  $[-CR^{74}=R^{75}-]$  group.
27. The oxidizing system according to one or more of claims 1-12 which is characterized in that the oxidation-enhancing compounds are compounds of the general formulae (XXXI), (XXXII) or (XXXIII)



5            where

Ar is a univalent homo- or heteroaromatic mono- or binuclear radical and where this aromatic radical may be substituted by one or more, identical or different  $\text{R}^{77}$  radicals, where  $\text{R}^{77}$  denotes halogen, formyl, cyano, carbamoyl, carboxyl, esters or salts thereof, sulfo, esters or salt thereof, sulfamoyl, nitro, nitroso, amino, phenyl, aryl- $\text{C}_1$ - $\text{C}_5$ -alkyl,  $\text{C}_1$ - $\text{C}_{12}$ -alkyl,  $\text{C}_1$ - $\text{C}_5$ -alkoxy,  $\text{C}_1$ - $\text{C}_{10}$ -carbonyl, carbonyl- $\text{C}_1$ - $\text{C}_6$ -alkyl, phospho, phosphono or phosphonooxy and also esters or salts thereof, and

15            where the phenyl, carbamoyl and sulfamoyl radicals may be unsubstituted or singly or multiply  $\text{R}^{78}$  substituted, the amino radical may be singly or doubly  $\text{R}^{78}$  substituted and the aryl- $\text{C}_1$ - $\text{C}_5$ -alkyl,  $\text{C}_1$ - $\text{C}_{12}$ -alkyl,  $\text{C}_1$ - $\text{C}_5$ -alkoxy,  $\text{C}_1$ - $\text{C}_{10}$ -carbonyl, carbonyl- $\text{C}_1$ - $\text{C}_6$ -alkyl radicals may be saturated or unsaturated, branched or unbranched and may be singly or multiply  $\text{R}^{78}$  substituted,

20            where  $\text{R}^{78}$  may occur one or more times and in each occurrence is the same or different and denotes hydroxyl, formyl, cyano or carboxyl and also esters or salts thereof, carbamoyl, sulfo and also esters and salts thereof, sulfamoyl, nitro, nitroso, amino, phenyl,  $\text{C}_1$ - $\text{C}_5$ -alkyl,  $\text{C}_1$ - $\text{C}_5$ -alkoxy or  $\text{C}_1$ - $\text{C}_5$ -alkylcarbonyl, and

$\text{R}^{76}$  in each occurrence is the same or different and denotes halogen, hydroxyl, mercapto, formyl, cyano, carbamoyl, carboxyl and also esters or

salts thereof, sulfo, esters or salts thereof, sulfamoyl, nitro, nitroso, amino, phenyl, aryl-C<sub>1</sub>-C<sub>5</sub>-alkyl, C<sub>1</sub>-C<sub>12</sub>-alkyl, C<sub>1</sub>-C<sub>5</sub>-alkoxy, C<sub>1</sub>-10-carbonyl, carbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, phospho, phosphono or phosphonooxy and also esters or salts thereof, and

5

R<sup>76</sup> may also denote hydrogen in the case of bicyclic stable nitroxyl free radicals (structure XXXIII), and

10

where the carbamoyl, sulfamoyl, amino, mercapto and phenyl radicals may be unsubstituted or singly or multiply R<sup>79</sup> substituted and the aryl-C<sub>1</sub>-C<sub>5</sub>-alkyl, C<sub>1</sub>-C<sub>12</sub>-alkyl, C<sub>1</sub>-C<sub>5</sub>-alkoxy, C<sub>1</sub>-C<sub>10</sub>-carbonyl, carbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl radicals may be saturated or unsaturated, branched or unbranched and may be singly or multiply R<sup>79</sup> substituted, where R<sup>79</sup> in each occurrence is the same or different and denotes hydroxyl, formyl, cyano, carboxyl, esters or salts thereof, carbamoyl, sulfo, esters and salts thereof, sulfamoyl, nitro, nitroso, amino, phenyl, C<sub>1</sub>-C<sub>5</sub>-alkyl, C<sub>1</sub>-C<sub>5</sub>-alkoxy or C<sub>1</sub>-C<sub>5</sub>-alkylcarbonyl and two R<sup>78</sup> or R<sup>79</sup> radicals at a time may be linked together pairwise via a [-CR<sup>80</sup>R<sup>81</sup>-]<sub>m</sub> bridge, where m is 0, 1, 2, 3 or 4, and

15

20

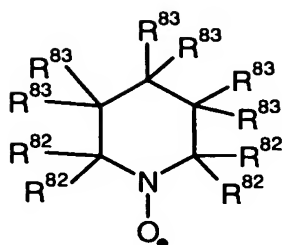
R<sup>80</sup> and R<sup>81</sup> are the same or different and denote halogen, carboxyl and also esters or salts thereof, carbamoyl, sulfamoyl, phenyl, benzoyl, C<sub>1</sub>-C<sub>5</sub>-alkyl, C<sub>1</sub>-C<sub>5</sub>-alkoxy or C<sub>1</sub>-C<sub>5</sub>-alkylcarbonyl and one or more nonadjacent [-CR<sup>80</sup>R<sup>81</sup>-] groups may be replaced by O, S or an optionally C<sub>1</sub>-C<sub>5</sub>-alkyl-substituted imino radical and two adjacent [-CR<sup>80</sup>R<sup>81</sup>-] groups may be replaced by one [-CR<sup>80</sup>=CR<sup>81</sup>-], [-CR<sup>80</sup>=N-] or [-CR<sup>80</sup>=N(O)-] group.

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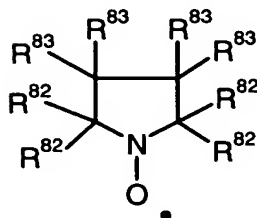
28. The oxidizing system according to one or more of claims 1-12 which is characterized in that the oxidation-enhancing compounds are compounds of the general formulae (XXXIV) and (XXXV)

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(XXXIV)



(XXXV)

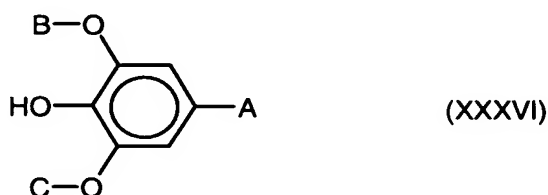
where

5  $R^{82}$  in each occurrence is the same or different and denotes phenyl, aryl- $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_{12}$ -alkyl,  $C_1$ - $C_5$ -alkoxy,  $C_1$ - $C_{10}$ -carbonyl or carbonyl- $C_1$ - $C_6$ -alkyl, where the phenyl radicals may be unsubstituted or singly or multiply  $R^{84}$  substituted and the aryl- $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_{12}$ -alkyl, carbonyl- $C_1$ - $C_6$ -alkyl radicals may be saturated or unsaturated, branched or unbranched and may be singly or multiply  $R^{84}$  substituted, where  $R^{84}$  may occur one or more times and in each occurrence is the same or different and denotes hydroxyl, formyl or carboxyl and also esters or salts thereof, carbamoyl, sulfo and also esters and salts thereof, sulfamoyl, nitro, nitroso, amino, phenyl, benzoyl,  $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_5$ -alkoxy or  $C_1$ - $C_5$ -alkylcarbonyl, and

20  $R^{83}$  in each occurrence is the same or different and denotes hydrogen, hydroxyl, mercapto, formyl, cyano, carbamoyl, carboxyl and also esters or salts thereof, sulfo and also esters or salts thereof, sulfamoyl, nitro, nitroso, amino, phenyl, aryl- $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_{12}$ -alkyl,  $C_1$ - $C_5$ -alkoxy,  $C_1$ - $C_{10}$ -carbonyl, carbonyl- $C_1$ - $C_6$ -alkyl, phospho, phosphono or phosphonooxy and also esters or salts thereof, where the carbamoyl, sulfamoyl, amino, mercapto and phenyl radicals may be unsubstituted or singly or multiply  $R^{78}$  substituted and the aryl- $C_1$ - $C_5$ -alkyl,  $C_1$ - $C_{12}$ -alkyl,  $C_1$ - $C_5$ -alkoxy,  $C_1$ - $C_{10}$ -carbonyl and carbonyl- $C_1$ - $C_6$ -alkyl radicals may be saturated or unsaturated, branched or unbranched and may be singly or

multiply  $R^{78}$  substituted and one  $[-CR^{83}R^{83}-]$  group may be replaced by O, an optionally  $C_1-C_5$ -alkyl-substituted imino radical, a (hydroxy)imino radical, a carbonyl function or an optionally  $R^{78}$  mono- or disubstituted vinylidene function and two adjacent  $[-CR^{83}R^{83}-]$  groups may be replaced by one  $[-CR^{83}-CR^{83}-]$  or  $[-CR^{83}=N-]$  or  $[-CR^{83}=N(O)-]$  group.

29. The oxidizing system according to one or more of claims 1-12 which is characterized in that the oxidation-enhancing compounds are compounds of the general formulae (XXXVI):



where

- A denotes a  $-D$ ,  $-\text{CH}=\text{CH}-D$ ,  $-\text{CH}=\text{CH}-\text{CH}=\text{CH}-D$ ,  $-\text{CH}=\text{N}-D$ , or  $-\text{N}=\text{CH}-D$  group, where D denotes a  $-\text{CO}-E$ ,  $-\text{SO}_2-E$ ,  $-\text{N}-\text{XY}$  or  $-\text{N}^+-\text{XYZ}$  group wherein E denotes either hydrogen, hydroxyl, a  $-R$  or  $-\text{OR}$  radical and X, Y and Z are the same or different and hydrogen or likewise a  $-R$  radical, where R is a  $C_1-C_{16}$ -alkyl radical, preferably a  $C_1-C_8$ -alkyl radical, and alkyl is in each case saturated or unsaturated, straight-chain or branched and optionally carboxyl, sulfo or amino substituted; and

B and C are the same or different and represent a  $C_mH_{2m+1}$  group where  $1 \leq m \leq 5$ .

30. The oxidizing system according to one or more of claims 1-12 which is characterized in that the oxidation-enhancing compounds comprise one of the following compounds:

- 3-amino-N-hydroxyphthalimide,  
4-amino-N-hydroxyphthalimide,  
N-hydroxyphthalimide,  
3-hydroxy-N-hydroxyphthalimide,  
5 3-methoxy-N-hydroxyphthalimide,  
3,4-dimethoxy-N-hydroxyphthalimide,  
4,5-dimethoxy-N-hydroxyphthalimide,  
3,6-dihydroxy-N-hydroxyphthalimide,  
3,6-dimethoxy-N-hydroxyphthalimide,  
10 3-methyl-N-hydroxyphthalimide,  
4-methyl-N-hydroxyphthalimide,  
3,4-dimethyl-N-hydroxyphthalimide,  
3,5-dimethyl-N-hydroxyphthalimide,  
3,6-dimethyl-N-hydroxyphthalimide,  
15 3-isopropyl-6-methyl-N-hydroxyphthalimide,  
3-nitro-N-hydroxyphthalimide,  
4-nitro-N-hydroxyphthalimide,  
1-hydroxybenzotriazole and its salts,  
1-hydroxybenzotriazole-4-sulfonic acid and salts thereof,  
20 1-hydroxybenzotriazole-5-sulfonic acid and salts thereof,  
1-hydroxybenzotriazole-6-sulfonic acid and salts thereof,  
1-hydroxybenzotriazole-7-sulfonic acid and salts thereof,  
1-hydroxybenzotriazole-4-carbonic acid and salts thereof,  
1-hydroxybenzotriazole-5-carbonic acid and salts thereof,  
25 1-hydroxybenzotriazole-6-carbonic acid and salts thereof,  
1-hydroxybenzotriazole-7-carbonic acid and salts thereof,  
violuric acid,  
N-hydroxyacetanilide,  
3-nitrosoquinoline-2,4-diol,  
30 2,4-dihydroxy-3-nitrosopyridine,  
2,6-dihydroxy-3-nitrosopyridine,  
2,4-dinitroso-1,3-dihydroxybenzene,  
2-nitroso-1-naphthol-3-sulfonic acid,

1-nitroso-2-naphthol-3,6-disulfonic acid, and  
methyl syringate.

31. A process for oxidizing oxidizable substances which is characterized in that  
5 the oxidizable substance is contacted with an oxidizing system according to  
one or more of claims 1-30.
32. A process for removing excess, unfixed dye from textile materials after a  
dyeing, preferably after a reactive dyeing, the process being characterized in  
10 that the dyed textile material is contacted with an oxidizing system according  
to one or more of claims 1-30 in at least one of the post-dyeing rinse steps.
33. The process according to claim 32 which is characterized in that the dyed  
textile material is contacted with the oxidizing system in at least one of the  
15 post-dyeing rinse steps by at least one of the rinse liquors having added to it
- 1) the three components of the oxidizing system individually in any  
desired order in succession or else individually and concurrently, or
  - 20 2) initially the two components of the macrocyclic metal complex and of  
the oxidation-enhancing compound either individually and  
concurrently or else as a conjoint formulation and subsequently the  
oxidizing agent or
  - 25 3) initially the two components of the oxidizing agent and of the  
oxidation-enhancing compound either individually and concurrently  
or else as a conjoint formulation and subsequently the macrocyclic  
metal complex.
- 30 34. Dyed textile material obtainable by the process according to claim 32 or 33.
35. A process for removing colored impurities from industrial wastewater,  
preferably from wastewater of the paper- or textile-processing industry, the  
process being characterized in that the industrial wastewater is contacted with

an oxidizing system according to one or more of claims 1 to 30.

36. Wastewater, preferably wastewater of the paper- or textile-processing industry, obtainable by the process according to claim 35.

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37. A process for lightening colored impurities on solid materials, preferably on textiles, paper or leather, the process being characterized in that the solid materials are contacted with an oxidizing system according to one or more of claims 1 to 30.

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38. Solid materials, preferably textiles, paper or leather, obtainable by the process according to claim 37.